ACCESS MANAGEMENT CONCEPTS

FOUR TO THREE LANE SECTION

As a part of this Access Management Study for the Ironwood to Wakefield corridor, U.P. Engineers & Architects, Inc. was asked to study the affects of replacing the current four lane cross-section with a three-lane section in the Cities of Bessemer and Ironwood. The following is information relating to case studies, along with discussion relating to this change. A recommendation can not be made at this time without additional traffic studies relating to the winter traffic conditions and specific turning movements at each of the key intersections within the heavier traffic locations along US-2.

General Discussion Points

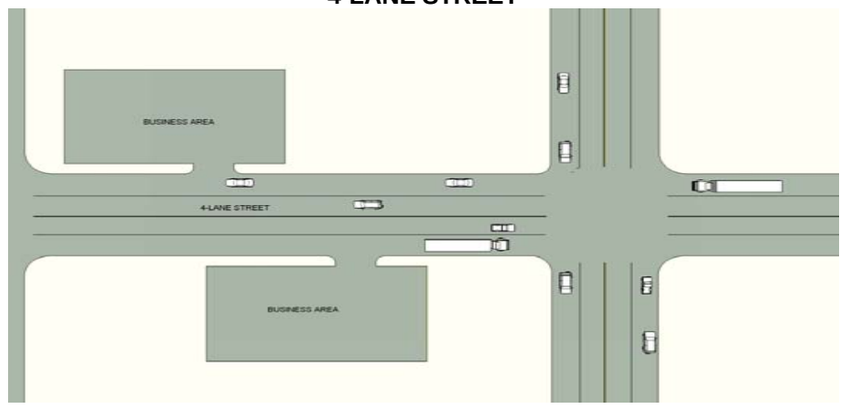
In recent years, many traffic engineers have advocated converting four-lane undivided urban streets to three-lane two-way left-turn facilities. A number of these conversions have been successfully implemented. Accident rates have decreased while corridor and intersection levels of service remained acceptable.

There are a number of potential benefits relating to the three-lane roadway section including:

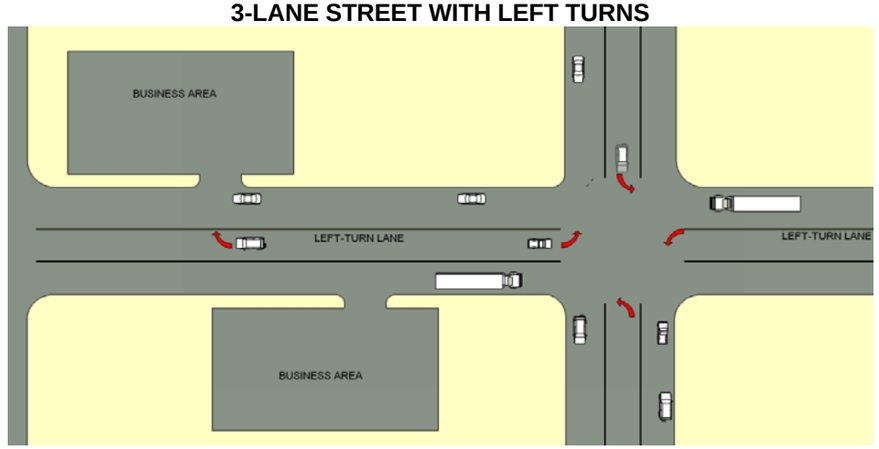
- Improved Vehicle Safety
- Improved Pedestrian Safety
- Traffic Calming
- Improved Emergency Response Time
- Potential Bike Accommodation
- Relatively inexpensive

Figure 25. Alternate modification to a 3-Lane Traffic

4-LANE STREET



3-LANE STREET WITH LEFT TURNS



Improved Vehicle Safety

This potential benefit is self explanatory. There is an elimination of drivers changing lanes to pass slower vehicles. Speeds are limited by the speed of the lead vehicle. This will reduce the number of side-swipes. Also reduced are the number of rear-end crashes, as vehicles are now using the left-turn lane. Studies have shown a reduction in the total number of crashes ranging from 17 to 62 percent[2]. The severity of the crashes has also decreased.

Improved Pedestrian Safety

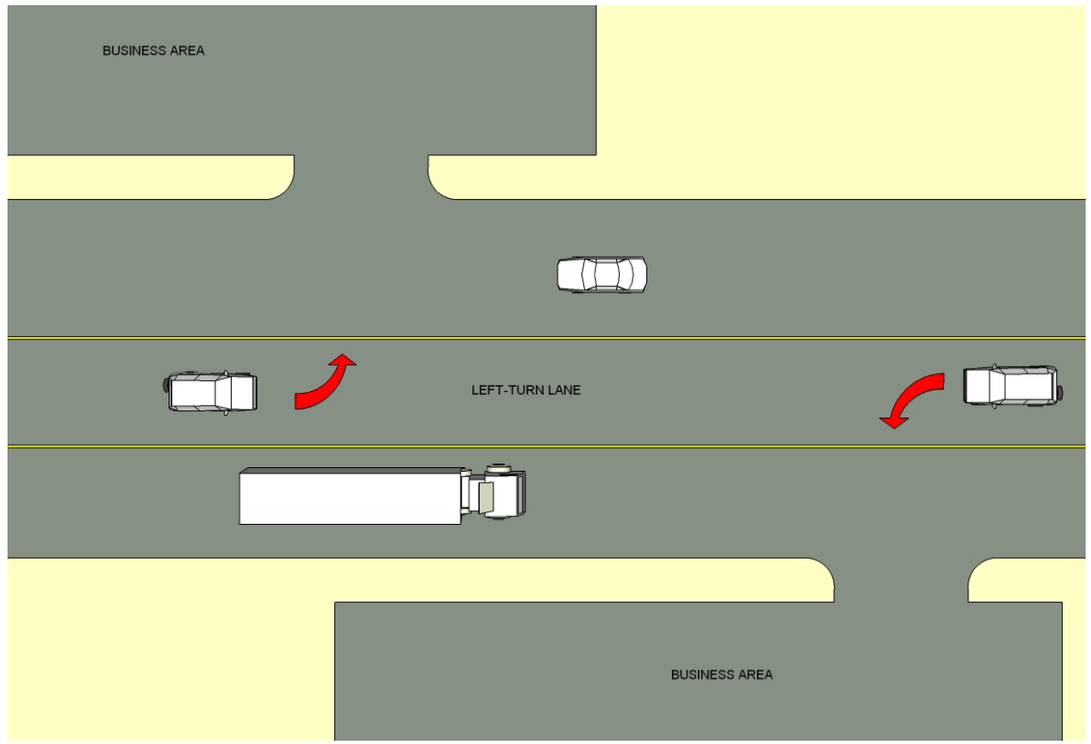
Pedestrian may benefit because they have fewer lanes of traffic to cross and because motor vehicles are likely to be moving more slowly. Currently there may not be room for placement of sidewalks within the vicinity of the roadway; by reducing the number of lanes, right of ways may have room to provide pedestrian facilities.

The three-lane configuration allows pedestrians to focus on one-lane of traffic at a time and medians or left-turn lanes can provide a refuge for pedestrians if needed. While the left-turn lanes are active lanes, they would have lower traffic volumes and slower speeds. Three-lane roadways create a more comfortable environment for pedestrians with less noise due to slower and more consistent traffic speeds.

Traffic Calming

Studies show that narrow roadways decrease the speed motorists feel comfortable traveling. In fact, studies found a dramatic reduction of excessive speeding (five miles per hour or faster). Another result of the three-lane configuration is lower speed variability which creates a more predictable and consistent travel environment.

Figure 26. Left-Turn Lane and Vehicle Safety



Improved Emergency Response Time

Emergency vehicles may use the left-turn lane as a means to travel unimpeded along a busy roadway.

Potential Bike Accommodation and Streetscape

The reduction in roadway cross section may provide additional room for use as a bike lane. In addition, the change could create opportunities for visual enhancements and streetscape improvements. Funding may be available through MDOT for these kinds of enhancements.

Relatively Inexpensive

This lane reduction does not require reconstruction of the existing roadway. Often the reduction can be accomplished with re-striping the roadway.

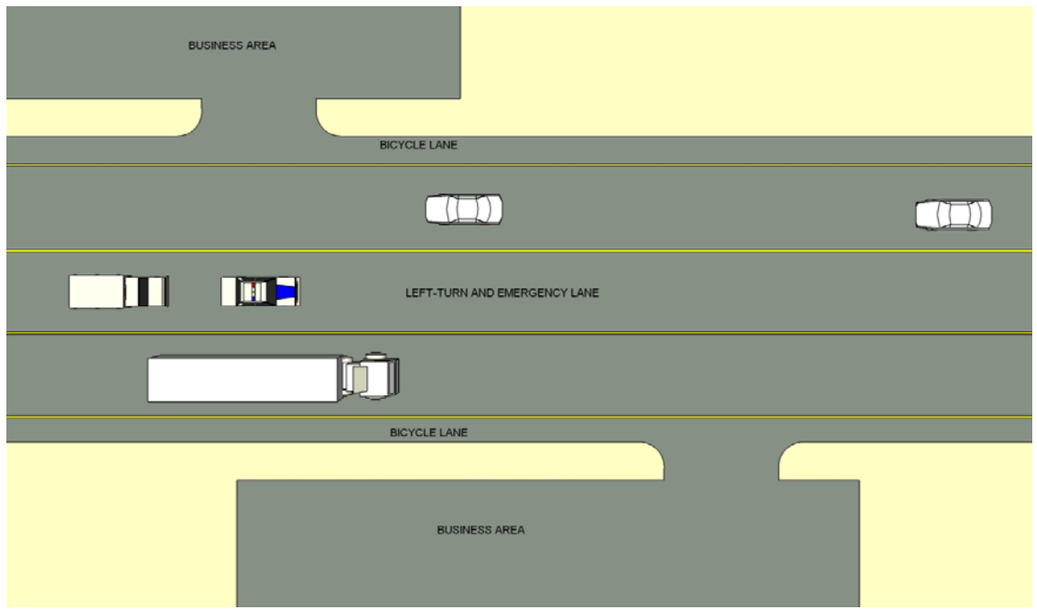
There are also potential disadvantages to the three-lane cross-section. Examples may be:

- Increased travel delay
- Frequent stop and/or slow moving vehicles
- Increased delays at driveways
- Loss of passing opportunities

Increased Travel Delay

Increased travel delay along the corridor is the primary concern many have with converting a four-lane roadway to a three-lane facility. Many assume there will be a 50% reduction in capacity because the number of “through lanes” is reduced by half. In reality the capacity of a three-lane facility is very near that of a four-lane undivided roadway.

Figure 27. Alternate Left-Turn / Emergency Lane and Bicycle Lanes



Drivers who want to travel through the corridor generally stay in the outside curb lane to avoid getting caught behind mid-block left-turning vehicles and very few through trips are made in those lanes. As such, only one lane in each direction is accommodating most of the through trips. The actual capacity of a corridor is controlled by the signalized intersections. These intersections generally have high volumes of left-turning traffic. As such, once again most of the through traffic is carried I one lane-the outside curb lane.

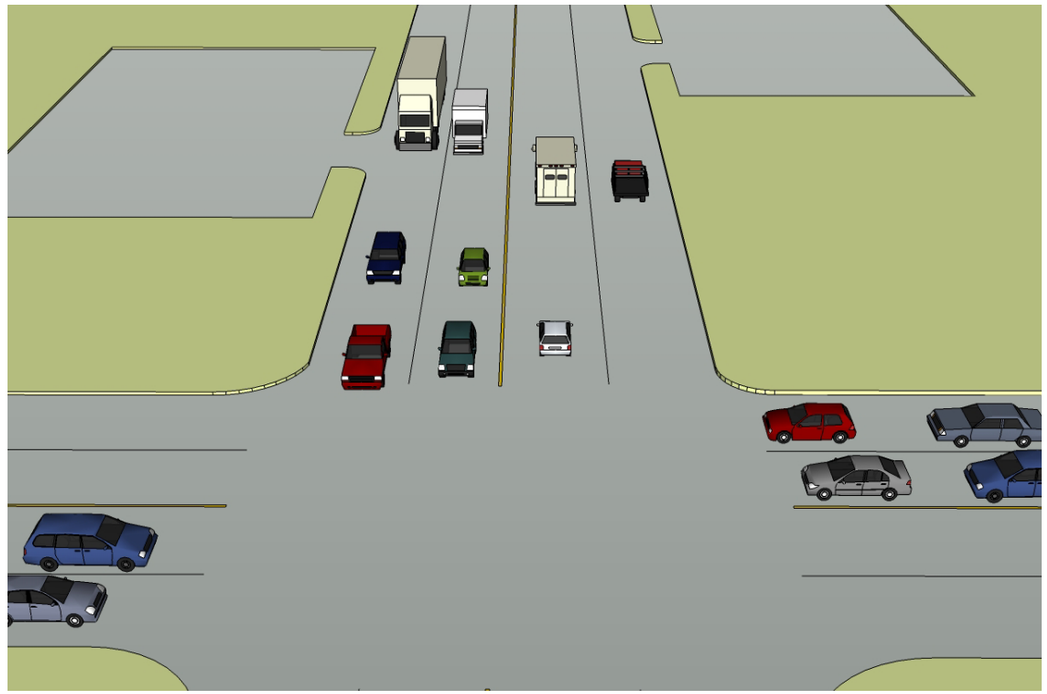
Loss of passing opportunities

This is a concern from aggressive motorists who do not want to lose the opportunity to pass along the corridor. As previously discussed, the disadvantage provides a benefit to pedestrians and other motorists trying to enter or cross the roadway. Some are of the opinion that aggressive drivers will use the center lane as a passing lane. While this does occur occasionally it is generally not a problem.

Specific Route Discussions

Prior to making a decision to reduce the number of lanes in a corridor, the primary question should be: What is the primary need in the corridor? Is the purpose of the corridor to move high volumes of traffic as quickly as possible? Or is it to improve corridor safety for motorists and pedestrians, while providing an acceptable level of service to corridor traffic? The answers to these questions will determine if converting to a three-lane facility is a viable alternative to include in the study.

Figure 28. High-volume traffic roadways

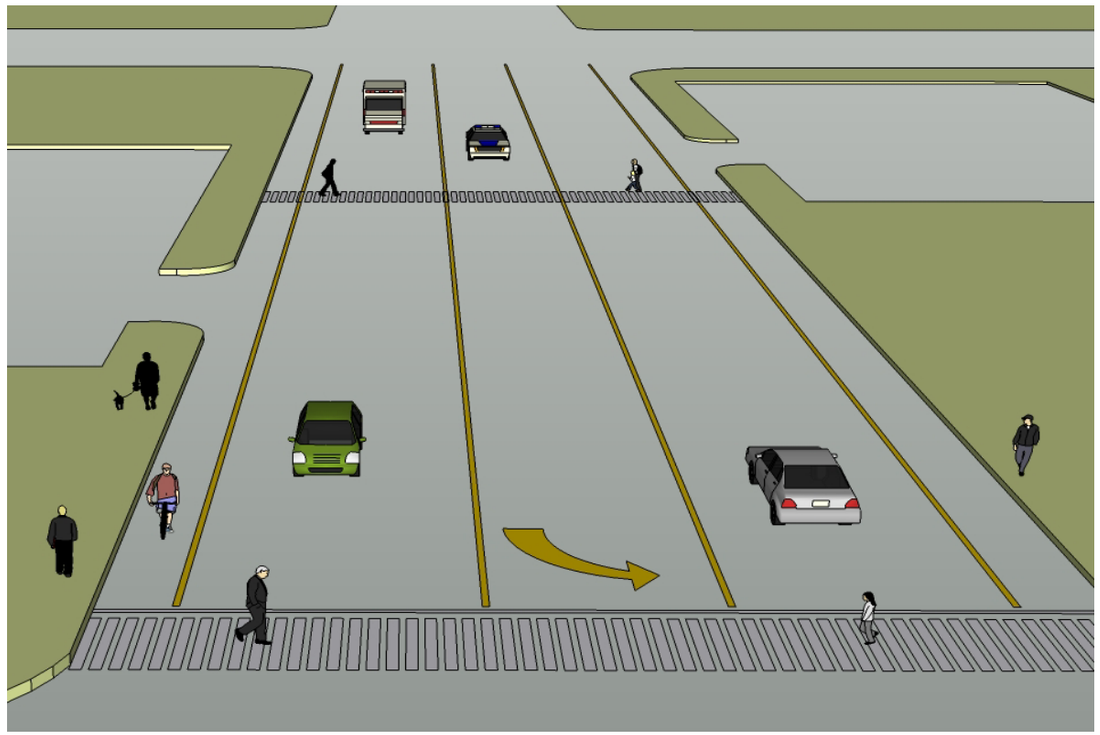


Prior to making a recommendation on this lane reduction for the Ironwood corridor, the following questions should be answered:

- Are the existing averages speeds appropriate given corridor land uses?
- Does speed variability create safety concerns and noise problems?
- Is the road near pedestrian activity areas, such as parks and schools or where improving the pedestrian environment is a priority?
- Is the road an existing or planned bicycle corridor
- Do high crash rates exist due to turning movements, excessive weaving, and /or stop and go traffic?
- How will this configuration affect the through truck traffic on US-2?
- What alternative routes may be affected by local traffic avoiding the corridor?

These questions will determine what the primary purpose of the corridor is.

Figure 29. Pedestrian-safe roadway



RECOMMENDATION

Based on the above discussion, the four-lane reduction to three-lane in the city of Bessemer would be beneficial. The low traffic counts, high pedestrian usage, low number of driveways and potential for bicycle traffic meet the criteria spelled out in the previous section(s).

As noted, the Ironwood corridor should be studied more thoroughly prior to making a recommendation.

REFERENCES

1. Michigan Intersection Safety Strategy and Near-Term Action Plan, Governor's Traffic Safety Advisory Commission, February 2004.
2. Urban Four-Lane Undivided to Three-Lane Roadway Conversion Guidelines, Knapp, Giese, and Lee, Iowa State University, 2003.

Figure 30. Ten Principles of Access Management

1. Determine roadway's type and function.
2. Identify main access points to major roads.
3. Define intersection hierarchy.
4. Locate signals to favor thorough traffic movement.
5. Preserve areas close to intersections as clear as possible.
6. Limit number of conflict points.
7. Increase the spacing between driveways and between access points.
8. Define turning lanes at intersections
9. Define turning lanes at mid block
10. Provide supporting or secondary roadways.

Source: Access management Manual RTB 2003